HEAT STRESS PROGRAM

Rose-Hulman Institute of Technology
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HEAT STRESS PROGRAM

1.0 Purpose

The Rose-Hulman Institute of Technology (RHIT) Heat Stress Program is to:

- Inform employees as to the hazards associated with working for extended periods in a hot environment, either indoors or out-of-doors
- Provide guidelines for recognizing symptoms of heat stress ranging from heat rash and heat cramps through heat exhaustion and heat stroke
- Reduce or eliminate employee injuries and illnesses caused by heat stress
- Comply with all applicable federal and state regulations

2.0 Regulatory Reference

29 CFR 1910 5.0 (a)(1) General Duty Clause

3.0 Scope

This document is intended as a master document that addresses regulatory requirements. Details specific to implementing the program for a specific department or job can be added by the user in the appendices of this program.

This program is applicable to all Rose-Hulman employees who perform work where the possibility of becoming overheated exists.

4.0 Elements of the Program

Heat stress can be a serious problem in hot working environments. The core body temperature for a human must be maintained within a very narrow range. An increase of 6.5°F can result in death. The body initially deals with the hot environment by lowering core body temperature by sweating and by circulating blood closer to the skin’s surface.

Unfortunately, these mechanisms have limitations, which when exceeded can cause a variety of dangerous heat related disorders:

- Heat rash
- Heat cramps
- Heat fatigue
- Heat syncope (fainting)
- Heat exhaustion
- Heat stroke

The seriousness of the conditions loosely progress from heat rash or cramps to heat stroke if the conditions causing heat stress are not addressed.
Primary factors causing heat stress include:

- High temperature environments
- High humidity environments
- Air movement
- Direct physical contact with hot objects (such as boiler rooms)
- Strenuous physical activities
- Work requiring heavy or impermeable clothing

Causal Factors include:

- Age
- Weight
- Degree of physical fitness
- Degree of acclimatization
- Personal metabolism
- Use of drugs (both prescription and non-prescription) and alcohol
- A variety of medical conditions
- Prior heat injury

Given the complexity of factors leading to heat stress, it is difficult to predict who might be affected and under what circumstances an employee might be affected. Thus, Rose-Hulman has developed a heat stress program intended to prevent employee injuries and illnesses from heat stress.

Heat Stress Prevention

- Training: Details of employee training can be found in Section 6.0.
- Acclimatization: An employee can best adapt to heat by being in the hot environment initially for very short periods, then longer periods. Acclimatization may take several days or longer, depending upon all the factors listed above. Acclimatization must be repeated if the employee is off work for an extended period or has been ill.
- Limiting exposure time: Work schedules must be designed to limit employee’s time spent in hot environments (for example, scheduling outdoor work during the cooler hours of the day). Work breaks must provide employees with opportunity to move to a cooler environment.
- Hydration: Employees must have access to sufficient quantities of liquids to replace fluids lost by sweating and normal metabolism. Employees must also have multiple opportunities to consume the liquids.
- Appropriate clothing: Whenever possible, clothing provided to workers in hot environments should be permeable to air and loose fitting. Less clothing is not necessarily a viable option, due to possibilities for radiant heat burns.
- Engineering controls: Use of fans to circulate air, general ventilation, air conditioning hot areas (when feasible), and increased air speed are all appropriate.
- Auxiliary body cooling: For employees who must work in areas at high risk for causing heat stress, commercially available cooling vests and other personal protection equipment (PPE) are available and should be considered.
Worker Monitoring Programs

- Every worker who works in high-risk heat stress conditions should be continuously monitored by themselves and a designated coworker or supervisor.

**Note:** Working alone in conditions with a high-risk for causing heat stress is not recommended.

Monitoring by a coworker should include watching for signs of:

- Hot, dry skin or absence of sweat
- Dizziness
- Shivering
- Nausea
- Irritability
- Severe headache
- Mental confusion
- Convulsions
- Unconsciousness
- Elevated heart rate (above 110 can be dangerous)
- Abnormal breathing rate
- Surface body temperature (any elevation above 99°F)

Tracking the amount of liquids consumed (eight ounces every 20 minutes) is considered appropriate in hot conditions.

Treating Heat Stress

Treatment of heat stress depends on the severity of the symptoms.

- Heat rash is considered an early indicator of potential heat stress. Typically it occurs in hot and humid conditions, where skin and clothing remain damp. Appropriate treatment includes cleaning the affected body areas, applying mild lotions, and keeping the area dry for at least 12 hours. Sweat production in the affected areas may not return to normal for several weeks.
- Heat cramps or spasms usually occur in the legs, arms, and abdomen, and are usually caused by performing hard physical labor in a hot environment. Heat cramps are indicative of lack of liquid replacement. Increased water intake is the preferred treatment. Typically, salt is not lost and does not need to be replaced. Drinking commercially-available electrolyte replacements is, however, not harmful.
- Heat syncope or heat fainting typically occurs when a worker must stand still in the heat for an extended period. It’s most serious aspect is the worker may be injured while falling (fainting) or fall into operating equipment. Avoidance includes moving around, drinking sufficient amounts of water, and taking breaks in a cooler environment. Treatment includes moving the employee who has fainted into a cooler environment, loosening clothing, and applying cool, moist cloths. Water should be administered only after the worker is again fully alert.
- Heat exhaustion is a serious condition resulting from reduction of body fluid or blood volume. A worker suffering from heat exhaustion may have some or all
these symptoms: heavy sweating, clammy, flushed or pale skin, weakness, dizziness, nausea, rapid and shallow breathing, headache, vomiting, or fainting. Treat by moving the victim to a cool area, place the victim on his/her back and elevate feet, loosen clothing, apply cool, moist cloths, fan the victim, slowly administer sips of water, and call for emergency medical care.

- Heat stroke is a medical emergency, characterized by confusion, irrational behavior, and loss of consciousness, convulsions, and potentially death. Emergency medical care should be called for immediately. Meanwhile, the worker should be moved to a cooler area, and outer clothing removed. Air movement around the worker should be increased by fans or other methods.

5.0 ADMINISTRATION/COMPLIANCE/RESPONSIBILITIES

At Rose-Hulman, the Office of Environmental Health and Safety Management (EHS) is responsible for the written heat stress guidelines. Department heads and supervisors are responsible for determining which work environments provide risk of causing heat stress in their employees. Such locations must be documented and employees made aware of the locations and the associated hazards. Department heads and supervisors are also responsible for providing appropriate engineering controls (ventilation, air conditioning, etc.), administrative controls (reduced work periods in hot environments, increased breaks, etc.), and personal protective equipment where appropriate. Department heads and supervisors must also ensure that employees use these controls and any other procedures intended to protect them from environments likely to cause heat stress.

Each individual employee must take responsibility for his/her own well-being when working in environments likely to cause heat stress. This includes dressing appropriately, consuming adequate liquids, recognizing signs and symptoms of overheating, and making supervisors aware when such signs and symptoms are noted in the worker himself or in coworkers.

6.0 TRAINING AND RECORDKEEPING

Training on heat stress is provided by EHS.

Supervisors of employees who work or potentially work in environments likely to cause heat stress are responsible for ensuring their employees receive adequate heat stress training given by EHS or the supervisors themselves.

Training should include:

- Identification of sites and work conditions likely to cause heat stress
- Factors affecting heat stress
- Predisposing physiological factors
- Signs and symptoms of each condition
- Means of preventing heat stress
- Treating heat stress
APPENDIX A: Definitions

**Acclimatization:** An administrative control where the employee initially only works in the high-risk environment for short periods with gradual increases in work times as the employee becomes tolerant of the working conditions.

**Causal Factors:** Human physiological factors, such as age, weight, and physical condition that affect an employee’s ability to tolerate environments likely to cause heat stress.

**Heat Stress:** Any of a number of heat-induced injuries and illnesses ranging in severity from mild (including heat cramps and heat rash), to moderate (heat syncope and heat exhaustion), to life threatening (heat stroke).

**Heat Rash:** A mild form of heat rash characterized by red papules usually appearing where clothing is restrictive.

**Heat Cramps:** Painful muscle contractions caused by consuming insufficient liquid when working in hot environments.

**Heat Syncope:** Fainting caused by standing in one position for a prolonged period of time in hot environments.

**Heat Exhaustion:** Heat stress characterized by headache, vertigo, weakness, thirst, and giddiness. Heat exhaustion, if left untreated, can progress rapidly to heat stroke.

**Heat Stroke:** A life-threatening form of heat stress characterized by a high body temperature (over 104°F), hot, dry skin, rapid heart rate, dizziness, shivering, nausea, irritability, mental confusion, convulsions, unconsciousness, and perhaps death.

**High-Risk Environments:** Work environments where workers are routinely exposed to hot and often humid working conditions, putting them at increased risk for heat stress disorders.

**Primary Factors or Environmental Factors:**
High temperature environments
High humidity environments
Air movement
Direct physical contact with hot objects (such as boiler rooms)
Strenuous physical activities
Work requiring heavy or impermeable clothing